

**10/526312****DT01 Rec'd PCT/PT 02 MAR 2005**AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

1. (original) An incandescent lamp with a carbon cycle process, in which a luminous body together with a filling is introduced in a vacuum-tight manner into a bulb, the luminous body including a metal carbide, the melting point of which is above that of tungsten, characterized in that the distance between the luminous body and the wall of the bulb is less than 18 mm, a first cycle process, which is attributed to the carbon, being effected by the use of carbon and at least one further element, in particular hydrogen, as fill additive, and a second cycle process, which is attributed to the metal, being effected by the use of a further element, preferably a halogen.

2. (original) The incandescent lamp as claimed in claim 1, characterized in that the luminous body is a coiled wire or a ribbon, consisting of tantalum carbide at least at its surface.

3. (original) The incandescent lamp as claimed in claim 1, characterized in that the bulb consists of quartz glass or hard

glass with a bulb diameter of between 5 mm and 35 mm, preferably between 8 mm and 15 mm.

4. (original) The incandescent lamp as claimed in claim 1, characterized in that the fill contains inert gas, in particular noble gas, if appropriate with additional small quantities of nitrogen, and at least one hydrocarbon, hydrogen and at least one halogen additive.

5. (original) The incandescent lamp as claimed in claim 1, characterized in that the luminous body consists of TaC, ZrC, HfC or an alloy of various carbides, preferably containing TaC, and in particular is a coiled wire.

6. (original) The incandescent lamp as claimed in claim 1, characterized in that the luminous body comprises a core and a coating at its surface, the core in particular being a rhenium wire or a carbon fiber or a bundle of carbon fibers which is/are coated with carbide.

7. (original) The incandescent lamp as claimed in claim 1, characterized in that the dimensions of the bulb are selected in such a way that the bulb wall temperature is between 100°C and 700°C.

8. (original) The incandescent lamp as claimed in claim 7, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, hydrogen 0.2% - 20%, bromine 0.05% - 0.5%:

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen bromide  $\text{HBr}$  or a halogenated hydrocarbon, preferably  $\text{CH}_2\text{Br}_2$ ,  $\text{CHBr}_3$  or  $\text{CH}_3\text{Br}$ .

9. (original) The incandescent lamp as claimed in claim 1, characterized in that the dimensions of the bulb are selected in such a way that the bulb wall temperature is between  $150^\circ\text{C}$  and  $900^\circ\text{C}$ .

10. (original) The incandescent lamp as claimed in claim 9, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, hydrogen 0.2% - 20%, chlorine 0.05% - 0.5%:

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );

- hydrogen chloride HCl or a halogenated hydrocarbon, preferably  $\text{CH}_2\text{Cl}_2$ ,  $\text{CHCl}_3$ , or  $\text{CH}_3\text{Cl}$ .

11. (original) The incandescent lamp as claimed in claim 1, characterized in that the dimensions of the bulb are selected in such a way that the bulb wall temperature is between  $150^\circ\text{C}$  and  $600^\circ\text{C}$ .

12. (original) The incandescent lamp as claimed in claim 11, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, hydrogen 0.2% - 20%, iodine 0.05% - 0.5%:

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen iodide HI or iodine  $\text{I}_2$  or an iodinated hydrocarbon, preferably  $\text{CH}_3\text{I}$  or  $\text{C}_2\text{H}_5\text{I}$ .

13. (original) The incandescent lamp as claimed in claim 1, characterized in that the total quantity of halogen introduced into the lamp is less than that of the hydrogen, and in particular the total quantity of halogen introduced into the lamp is smaller by a factor of 5 to 25 than the total quantity of hydrogen introduced.

14. (original) The incandescent lamp as claimed in claim 11, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, hydrogen 0.2% - 20%, iodine 0.1% - 20%:

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen iodide  $\text{HI}$  or iodine  $\text{I}_2$  or an iodinated hydrocarbon, preferably  $\text{CH}_3\text{I}$  or  $\text{C}_2\text{H}_5\text{I}$ .

15. (original) The incandescent lamp as claimed in claim 9, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, hydrogen 0.2% - 20%, chlorine 0.05% - 0.5%, iodine 0.1% - 20%:

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen chloride  $\text{HCl}$  or an halogenated hydrocarbon, preferably  $\text{CH}_2\text{Cl}_2$ ,  $\text{CHCl}_3$  or  $\text{CH}_3\text{Cl}$ ;
- hydrogen iodide  $\text{HI}$  or iodine  $\text{I}_2$  or an iodinated hydrocarbon, preferably  $\text{CH}_3\text{I}$  or  $\text{C}_2\text{H}_5\text{I}$ .

16. (original) The incandescent lamp as claimed in claim 15, characterized in that the iodine content and the hydrogen content are equal bar a factor of 2.

17. (original) The incandescent lamp as claimed in claim 7, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, hydrogen 0.2% - 20%, bromine 0.05% - 0.5%, iodine 0.1% - 20%:

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen bromide  $\text{HBr}$  or a brominated hydrocarbon, preferably  $\text{CH}_2\text{Br}_2$ ,  $\text{CHBr}_3$  or  $\text{CH}_3\text{Br}$ ;
- hydrogen iodide or iodine  $\text{I}_2$  or an iodinated hydrocarbon, preferably  $\text{CH}_3\text{I}$  or  $\text{C}_2\text{H}_5\text{I}$ .

18. (original) The incandescent lamp as claimed in claim 17, characterized in that the iodine content and the hydrogen content are equal bar a factor of 2.

19. (original) The incandescent lamp as claimed in claim 1, characterized in that an additional carbon/nitrogen cycle process assists the carbon/hydrogen cycle process and at the same time a halogen is present.

20. (currently amended) The incandescent lamp as claimed in ~~claims 8 or 10 or 12 or 14 or 15 or 17~~ Claim 8, in which in addition from 0.3 mol% to 3 mol% of CN or CS are present in the gas phase.

21. (original) The incandescent lamp as claimed in claim 1, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%):

- carbon 0.25% - 5%, sulfur 0.05% - 5%, hydrogen 0.5% - 40%,
- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen sulfide  $\text{H}_2\text{S}$  or carbon disulfide  $\text{CS}_2$  or methyl mercaptan  $\text{CH}_3\text{SH}$  or ethyl mercaptan  $\text{C}_2\text{H}_5\text{SH}$  or dimethyl sulfide  $\text{CH}_3\text{CSCH}_3$ .

22. (original) The incandescent lamp as claimed in claim 21, characterized in that

- the molar concentration of the total element sulfur introduced into the lamp is lower by a factor of 0.1 to 1 than the molar concentration of the total element carbon introduced into the lamp, and

- the molar concentration of the total element hydrogen introduced into the lamp is preferably at least equal to the sum of four times the molar concentration of carbon and double the molar concentration of sulfur, in which context in particular the molar concentration of the hydrogen may be greater than this minimum quantity by up to factor of 8.

23. (original) The incandescent lamp as claimed in claim 1, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, sulfur 0.05% - 5%, hydrogen 0.5% - 40%, iodine 0.2% - 40%

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen sulfide  $\text{H}_2\text{S}$  or carbon disulfide  $\text{CS}_2$  or methyl mercaptan  $\text{CH}_3\text{SH}$  or ethyl mercaptan  $\text{C}_2\text{H}_5\text{SH}$  or dimethyl sulfide  $\text{CH}_3\text{CSCH}_3$
- hydrogen iodide  $\text{HI}$  or methyl iodide  $\text{CH}_3\text{I}$  or ethyl iodide  $\text{C}_2\text{H}_5\text{I}$ .

24. (original) The incandescent lamp as claimed in claim 23, characterized in that

- the molar concentration of the total element sulfur introduced into the lamp is lower by a factor of 0.1 to 1 than



the molar concentration of the total element carbon introduced into the lamp, and

- the molar concentration of the total element hydrogen introduced into the lamp is preferably at least equal to the sum of the molar concentration of carbon multiplied by 4 and the molar concentration of sulfur multiplied by two; in some cases, the molar concentrations of the hydrogen may be greater than the minimum quantity by up to a factor of 8, and
- the molar concentration of the element iodine introduced into the lamp is between 0.1% and 15% and is lower than the total molar concentration of hydrogen that is present.

25. (original) The incandescent lamp as claimed in claim 9, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.25% - 5%, sulfur 0.05% - 5%, hydrogen 0.5% - 40%, chlorine or bromine 0.02% - 0.5% or iodine 0.02% - 40% (if hydrogen to is to be bonded by iodine)

- hydrocarbon, preferably  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ ;
- hydrogen ( $\text{H}_2$ );
- hydrogen sulfide  $\text{H}_2\text{S}$  or carbon disulfide  $\text{CS}_2$  or methyl mercaptan  $\text{CH}_3\text{SH}$  or ethyl mercaptan  $\text{C}_2\text{H}_5\text{SH}$  or dimethyl sulfide  $\text{CH}_3\text{CSCH}_3$

- a halogenated hydrocarbon, e.g. one or two of the following compounds:  $\text{CH}_2\text{Cl}_2$ ,  $\text{CHCl}_3$ ,  $\text{CCl}_4$ ,  $\text{CH}_2\text{Br}_2$ ,  $\text{CH}_3\text{Br}$ ,  $\text{CH}_3\text{I}$ ,  $\text{C}_2\text{H}_5\text{I}$ ,  $\text{HCl}$ ,  $\text{HBr}$ ,  $\text{HI}$ ,  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{I}_2$ .

26. (original) The incandescent lamp as claimed in claim 25, characterized in that

- the molar concentration of the total element sulfur introduced into the lamp is lower by a factor of 0.1 to 1 than the molar concentration of the total element carbon introduced into the lamp, and

- the molar concentration of the total element hydrogen introduced into the lamp is preferably at least equal to the sum of the molar concentration of carbon multiplied by 4 and the molar concentration of sulfur multiplied by two and one times the concentration of chlorine or bromine; in some cases the molar concentration of the hydrogen may be greater than the minimum quantity by up to a factor of 8.

27. (original) The incandescent lamp as claimed in claim 11, characterized in that in addition to the inert gas the following additives are present for the fill in the bulb, so that the total content in the gas phase, based on a cold filling pressure of 1 bar, is preferably as follows (in mol%): carbon 0.1% - 5%, sulfur 0.02% - 5%, chlorine 0.42% - 30%,

- carbon tetrachloride  $\text{CCl}_4$ , disulfurdichloride  $\text{S}_2\text{Cl}_2$  or sulfur dichloride  $\text{SCl}_2$ , and if appropriate also chlorine  $\text{Cl}_2$  or nitrogen trichloride  $\text{NCl}_3$  or
- carbon tetrachloride  $\text{CCl}_4$ , carbon disulfide  $\text{CS}_2$ , chlorine  $\text{Cl}_2$  or nitrogen trichloride  $\text{NCl}_3$ .

28. (original) The incandescent lamp as claimed in claim 27, characterized in that the following features are fulfilled:

- the molar concentration of the total element sulfur within the lamp is lower by a factor of 0.1 - 1 than the total quantity of carbon present in the lamp;
- the molar concentration of chlorine is preferably greater than the sum of the molar concentration of carbon multiplied by four and the molar concentration of sulfur multiplied by two.